There is a clear passage into the polar area, and probably up to and beyond the pole; and within this area there is a continual diminution of bulk of the entering water as it becomes cooled, as well as a continual subsidence of the surface water, producing a partial depression to be constantly filled by water from the south. Experiment proves that if at one end of a vessel of warm water ice is applied at the surface, the cooled water instantly sinks, and its place is taken, not by water rising upwards from below, but by a horizontal movement of the surface gradually propagated to the other end of the vessel, while the descending cold water creeps along the bottom, and gradually acquiring a higher temperature, rises and completes the circuit. It is somewhat difficult to conceive, theoretically, how such a circulation can commence, because the cooled atoms of water must displace others before they can descend, and these again must displace others, and so on over the whole mass. The amount of energy due to the superior weight of the first-cooled atoms may appear inadequate to perform so much work, but nevertheless circulation does commence and indefinitely continues so long as a difference of temperature of the two ends of the vessel is kept up. The extreme mobility of the particles of water, and the almost total absence of friction between them, seems to be influential in producing this result; and it is not probable that any minute difference of level that may be caused on the surface of the water by difference of temperature has anything to do with the motion; and I cannot help thinking that the supposed six-feet incline from the equator to lat. 60° is, if it exists, by no means an effective cause of the oceanic circulation.

ALFRED R. WALLACE

I THINK the root of Mr. Croll's difficulty (see NATURE, p. 324) is to be found in his overlooking the possibility of energy becoming potential in the distribution of oceanic water.

Water running in any direction in the northern hemisphere tends to swerve to its own right, and if this tendency is checked (as it is in fact by the presence of continents) its layers of equal density will be tilted up on the right, the limit of tilt being the angle whose tangent is the quotient of the tendency to swerve by the force of gravity. This consideration is, I think, sufficient to deprive Mr. Croll's argument of one of the two legs on which it stood.

Mr. Ferrel's argument from the tides is quite conclusive in showing that the forces arising from difference of temperature are of sufficient magnitude to keep up an oceanic circulation. Thus the other leg of Mr. Croll's argument is gone.

Mr. Croll may well retract his previous assertion that the difference of kinetic energy is consumed in friction, for he was in a fair way to bring the earth to a standstill.

Brighton, August 20 J. D. EVERETT

Spectrum of Aurora

A FINE aurora was seen at Bedford on Thursday night between midnight and one o'clock. It was brightest under the Polar Star near the horizon, where the colour was a pale green; whilst overhead the hue often changed to a rosy red. On directing a spectroscope at the most brilliant part, a bright green line (W.L. 557) was very distinct, and two or three faint nebulous bands more refrangible were visible; but the red line was not to be seen, though carefully looked for on the rosy parts of the aurora. Objects around were faintly illuminated as if by a young moon. At one time two very faint pale green streamers were seen stretching from the north to a little east of the zenith.

Blackheath, August 11 J. P. MACLEAR

The Method of Least Squares

As the wording of Prof. Hall's letter in NATURE for July 25 might imply that he was calling attention to evidence that would change the opinion expressed in my letter, it seems to me worth while to state that at the time of writing that letter I was acquainted with the passages in question, and to repeat my assertion that with reference to the *method of least squares* I should not regard the neglect of Lagrange's memoir as an omission. Also in spite of Encke's and Prof. Hall's remarks, I think it has received as much attention as, viewed practically, its importance entitled it to.

With regard to the principle of the Arithmetic Mean, I may add that I have devoted the greater part of a tolerably long memoir to its consideration, and feel sure that no remarks on the subject contained in a few lines could be rendered even intelligible. J. W. L. GLAISHER

Blackheath, August 11

NOTES

WE are informed that M. Faye will in all probability be M. Delaunay's successor as Director of the Observatory at Paris. In the meantime M. Matthieu supplies his place *pro tem.*

THE French Academy has elected two foreign correspondents in the section of botany—M. Planchon in the place of M. Lecoq, and M. Weddel in the place of Prof. Mohl.

THE American Association for the Advancement of Science was to commence its sittings yesterday at Dubuque, Iowa. Prof. J. Lawrence Smith, of Louisville, had been elected President, and Prof. Alexander Winchell, of Ann Arbor, Vice-President. It was announced that the citizens of Dubuque had determined that all members attending the meeting should be entertained at their private residences free of charge during the session; and their travelling expenses would also probably be remitted by the various railroad and steamboat lines. A very successful meeting was anticipated.

AT the recent combined First B.A., First B.Sc., and Preliminary Scientific (M.B.) Examinations of the University of London, Mr. J. M. Lightwood, of Trinity Hall, Cambridge, obtained the Exhibition in Mathematics and Philosophy; Mr. R. E. Carrington, of Guy's Hospital, the Exhibitions in Chemistry and in Zoology; and Mr. J. C. Saunders, of Downing College, Cambridge, the Exhibition in Botany.

WE regret to announce the death of Mr. Frederick Carpenter Skey, C.B., F.R.S., which took place on Thursday last at his residence, Mount Street, Grosvenor Square. Mr. Skey was in his 73rd year. He was in early life a pupil of the celebrated Dr. Abernethy, to whom he was articled in 1816 by the Royal College of Surgeons. About 1826 he was appointed Demonstrator of Anatomy at St. Bartholomew's Hospital. Subsequently he founded the Aldersgate School of Medicine, which became one of the largest in London. From that time to his death Mr. Skey enjoyed the reputation of being in the first rank of London surgeons. His writings on medical subjects were numerous and important, and on subjects connected with sanitary science his communications to the public journals were frequent.

THE following is the list of candidates who have been successful in obtaining Royal exhibitions of 50*l.* per annum each for three years in the Science and Art Department, and free admission to the course of instruction at the following institutions:—To the Royal School of Mines, Jermyn Street—William Carter, Ambrose R. Willis, and Alexander Gibson. To the Royal College of Science, Dublin—Arthur G. Meeze, Denis Coyle, and Ernest H. Cook.

A NATURAL History Society has been formed at Madrid called "La Sociedad Española de Historia Natural," under the presidency of Don Miguel Colmeiro. The first part of its publication has reached this country, and contains the regulations of the Society, an account of the meetings held by it up to this time, and papers by Poey on Ichthyology, by Colmeiro on the Fumitories of Spain and Portugal, by Espada on the Volcano of Ansango, by Solano on a Meteoric Stone, by Espada on New America Batrachians, and by Perez Arcas on New Reptiles and Insects of the Spanish Fauna. It is extremely well printed, and is illustrated by three capital plates. The subscription to the

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society is 12*s*. 6*d*. Anyone desiring to become a member may address himself to Don Serafin de Uhagon, Sordo 27, Madrid, the treasurer, or to any other member.

PRIZES for Collections of Economic Entomology are offered for competition in 1873, and the following rules relating thereto have been issued by the Royal Horticultural Society:—10*l*. for a collection of British insects injurious to some one order of plant used for food—as Cruciferæ, Leguminosæ, or corn. The order may be selected by the competitor. 3*l*. for a miscellaneous collection of British insects injurious to plants used as food. 5*l*. for a collection of British beetles injurious to timber and fruit trees either growing or felled. 2*l*. for a collection of British insects injurious to some one timber or fruit tree. The insects are to be exhibited in their various stages of development, accompanied by specimens, models, or drawings of the injuries caused by them. The collections are to be sent in addressed to James Richards, Assistant-Secretary, Royal Horticultural Society, South Kensington, on or before November 1, 1873.

THE threatened destruction of the "Cursus," at Stonehenge, by the ploughing up of the land, is attracting so much public attention, that we may hope it will be in time to arrest this piece of Vandalism.

THE largest and most important of the fragments of the carved column dug up by Mr. Wood at a depth of 23 feet on the supposed site of the Temple of Diana at Ephesus, has been set up in the Græco-Roman room at the British Museum. It measures about 6 feet in height and 18½ feet in circumference, and it is supposed to have formed a portion of the first drum of one of the thirty-six Ionic carved columns which, with ninety-one others, supported and adorned the structure. Portions of the base and capital of the column were also found close by. On the side of the drum, which has sustained comparatively slight injury, there are five figures of considerable beauty, but all more or less mutilated. Of only two of these can the identity be determined—namely, the figures of Mercury and Victory. The former is perfect, with the exception of the face, which is slightly mutilated, and is regarded by competent judges as a work of considerable merit.

DR. HAYDEN, in charge of the Geological Survey of the Territories, having completed his preliminary arrangements at Ogden, has separated his forces into two divisions, one of which was to proceed to Fort Hall, with waggons and a suitable outfit, to be changed into a pack train at Fort Hall, and thence to travel up the Snake Valley, under the direction of Mr. Stevenson; the other division, under the doctor's own charge, was to start soon for Fort Ellis, and expected to be at work there by the 1st of July. Among other interesting observations already made by Dr. Hayden's expedition, was the occurrence of invertebrate animal life in great abundance in the Great Salt Lake. This fact is not entirely new, as the existence of dipterous larvæ in these waters has already been recorded by Captain Stansbury and others.

PROF. DAVIDSON, of the United States Coast Survey, has recently, before the Academy of Sciences of San Francisco, contested the theory of Mr. Octave Pavy in regard to polar currents and the topography of the polar regions. In his paper the professor maintains, in opposition to the views of Mr. Pavy, that the currents flow eastward through the straits north of the American continent, and that the current through Behring Straits is local, and unimportant in its effects as regards the polar basin; that Wrangell's Land is not a region continuous to a great distance toward the pole, as contended by Mr. Pavy, but a small island or cluster of islands.

THE BRITISH ASSOCIATION MEETING AT BRIGHTON

BRIGHTON, *Tuesday Morning*

THERE is a general agreement that the Brighton meeting of the British Association is a brilliant one; though we fear that this phrase, as used among Brightonians, refers rather to the fashionable character of the audiences at the various sections than to the scientific value of the papers read. Not that this latter has been below the average; but so far at least there has been no one paper or discussion which has placed a distinctive character on the meeting of 1872 as marking an epoch in scientific thought. We miss, also (no doubt owing to the remoteness of the locality from the great intellectual foci of the north), the familiar faces of many who are wont to add life and interest to our meetings; while the London *savans* do not appear to muster in greater force than when the meeting is held 300 miles from the metropolis. The spacious dome of the Pavilion was crowded to its utmost capacity on Wednesday evening, to hear Dr. Carpenter's opening address; and so admirable are the acoustic properties of the building, that each word was distinctly heard in every corner, if we may use the term in describing a circular room. Among the distinguished visitors, the curiosity of the audience was about equally divided between Mr. Stanley and the ex-Emperor of the French, both of whom occupied seats on the platform. The total number of tickets issued up to Wednesday evening was 2,140, or only 400 short of the Edinburgh total. Although the rooms in which the various sections are held are scattered, the distances are not great, and the splendid weather makes it easy to get from one to another. The localities selected give rise to some singular incongruities; as when wandering into the Friends' Meeting House, where Section G finds its local habitation, we heard a paper read from the "Ministers' Gallery," "On the progress of invention in breech-loading small arms during the past twenty years."

At the meeting of the General Committee previously held, the Report of the Council was read, in which the following are the more important features:—

The Council announce that a vacancy has occurred in the number of the trustees in consequence of the death of Sir Roderick Murchison, and take this opportunity of expressing their regret at the great loss which science has sustained by his death. He worked long, earnestly, and with eminent success in the sciences of geology and geography, and was at all times a steady patron of rising scientific men in all branches of science. He was a member and strenuous supporter of this Association at its first formation in 1831, and continued until the close of his life a very constant attendant at its meetings and a firm promoter of its interests. The Council recommend that Sir John Lubbock, Bart., be selected to fill the vacancy.

The next subject referred to is the appointment of the Committee to promote observations on the Total Solar Eclipse of December last, from which a Report will be read in due course. The results will be published by the Association to form part of a series uniform with the contemplated reports of the Royal Astronomical Society of the observations of the eclipses of 1860 and 1870.

There were five other resolutions referred to the Council for consideration or action, upon which the proceedings of the Council have been as follows:—

First resolution:

"That the President and Council of the British Association be authorised to co-operate with the President and Council of the Royal Society, in whatever way may seem to them best, for the promotion of a circumnavigation expedition, specially fitted out to carry the physical and biological exploration of the deep sea into all the great oceanic areas."

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